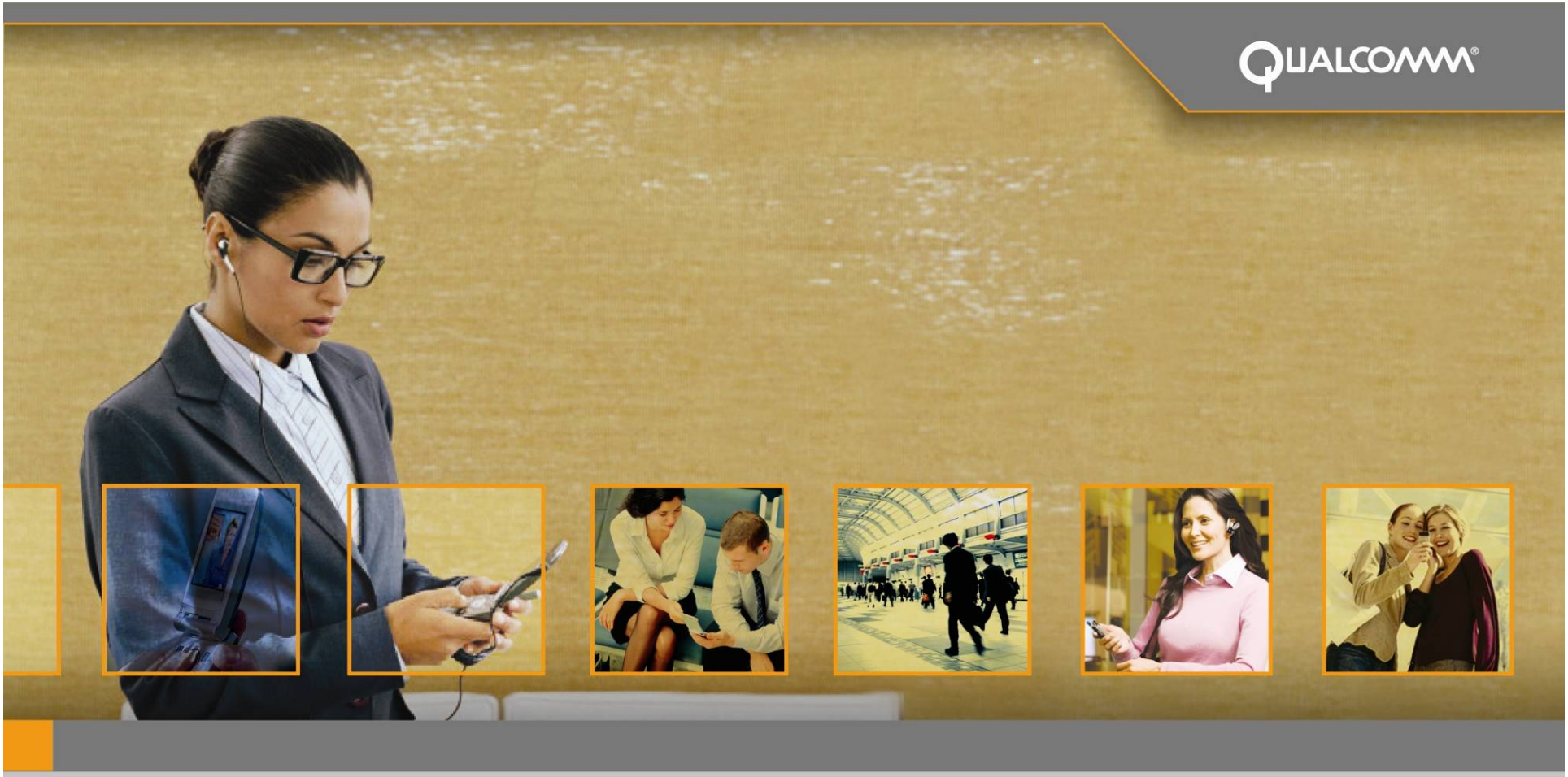


CDMA Technology Roadmap

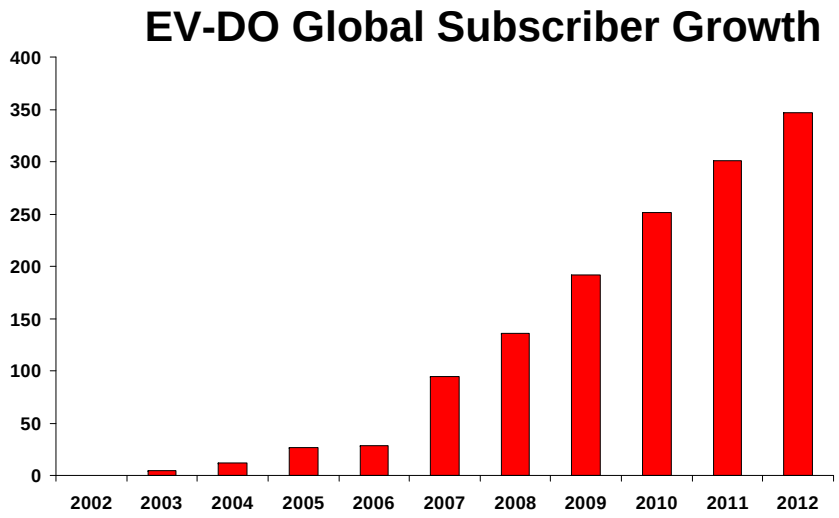
CDG NARC
San Diego
20 November 2008

Ed Tiedemann
Senior Vice-President Engineering
Qualcomm Fellow
3GPP2 TSG-C Working Group 3 Chair

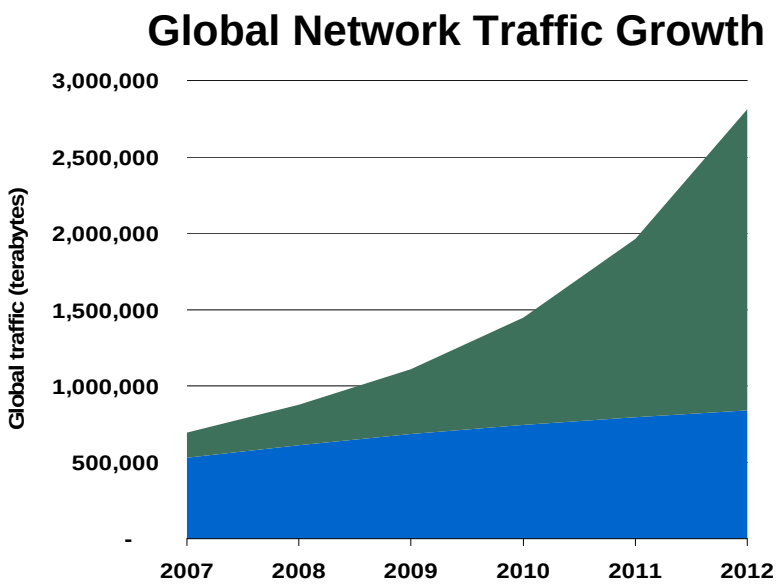
The Status of EV-DO

- **What do we have?**
  - **Large deployments with one or more carriers of Rev A**
  - **123 EV-DO networks in 62 countries (270 1X)**
  - **More than 105 million DO subscribers world-wide**
  - **Multi-carrier DO Rev B under development**

- **What would we like?**
  - **Meet growing data demand**
  - **Offer even better user experiences**
  - **Reduce cost of delivering data services**
  - **Maximize return on DO Investments (infrastructure and devices)**

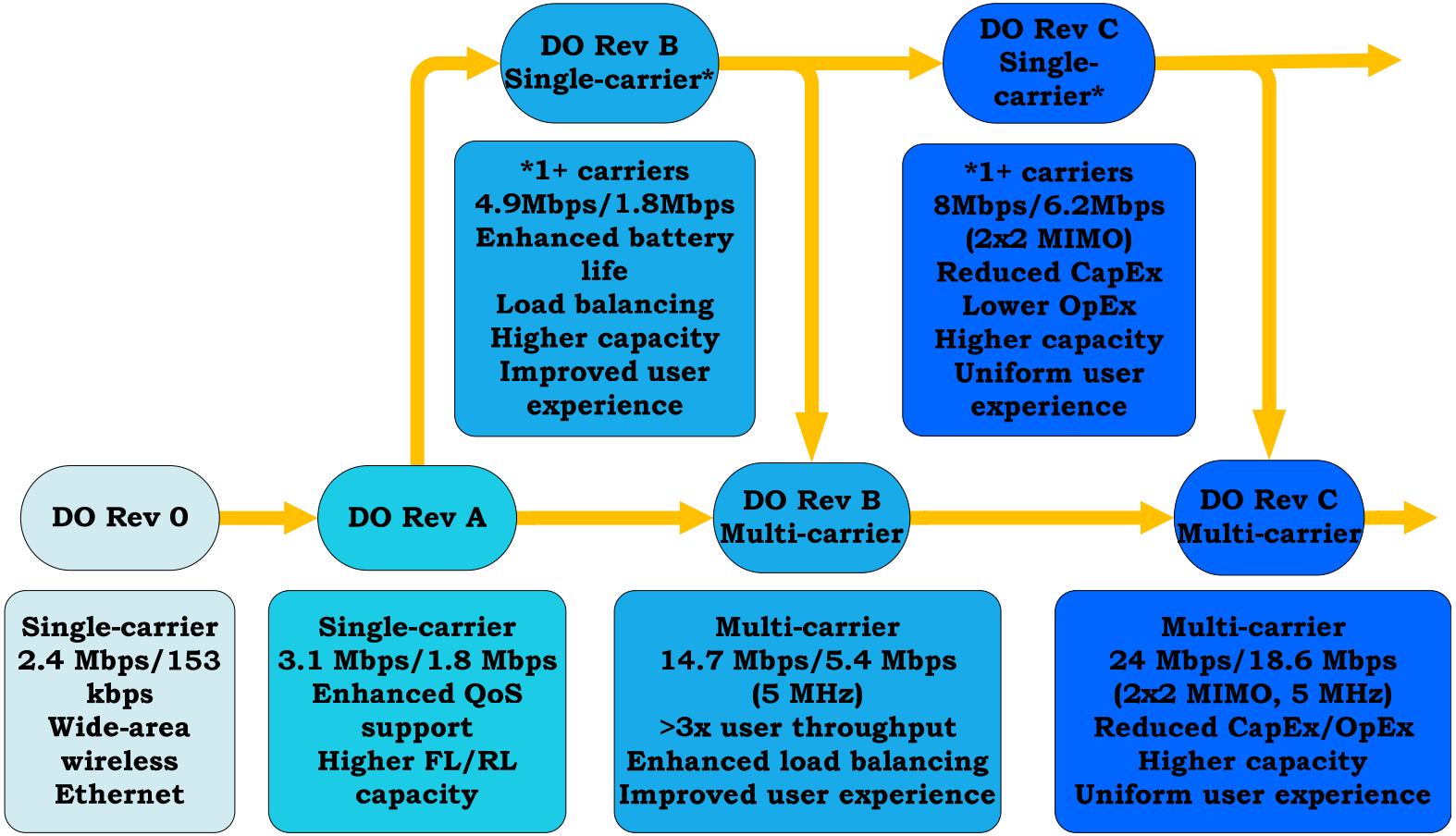


Sources: Average of Strategy Analytics (June 2008) and Yankee Group (June 2008)



Source: Informa TM

EV-DO Roadmap



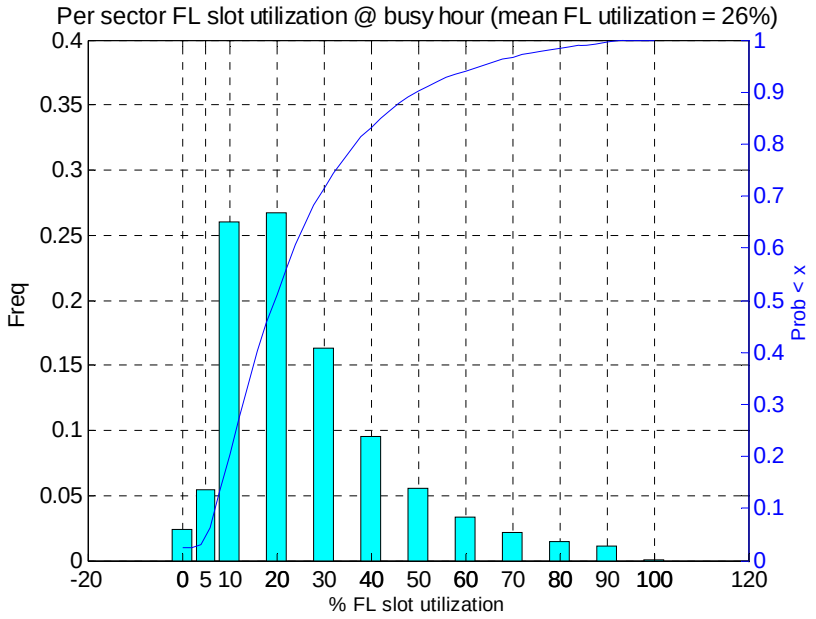
HDP – Highly Detectable Pilot (C.S0093)

Note: Multicarrier data rates assume 3 carriers, which need not be continuous; EV-DO Rev B specifications support up to 15 carriers

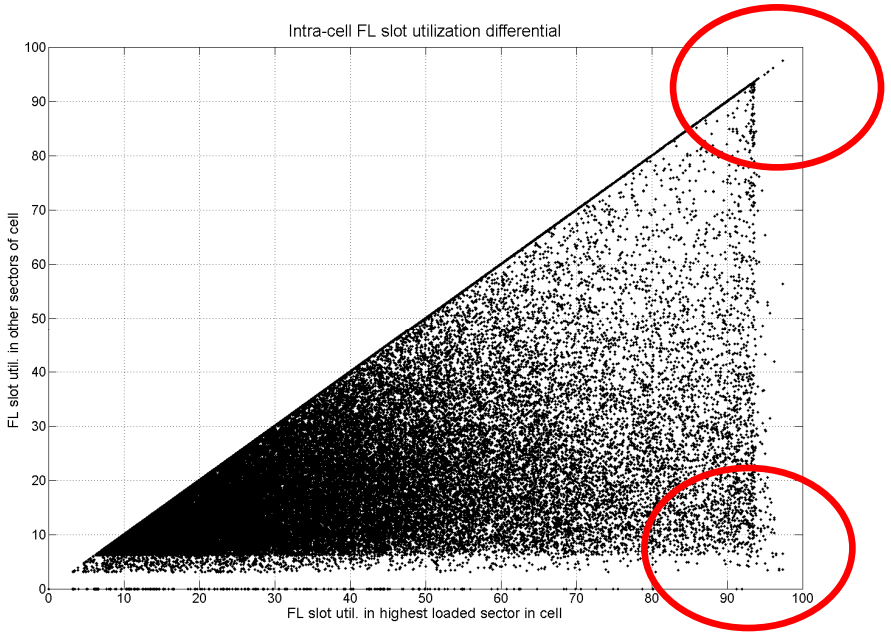
Observations

- **Network performance is defined by user experience at cell-edge**
- **Demand is spatially non-uniform and time-varying**

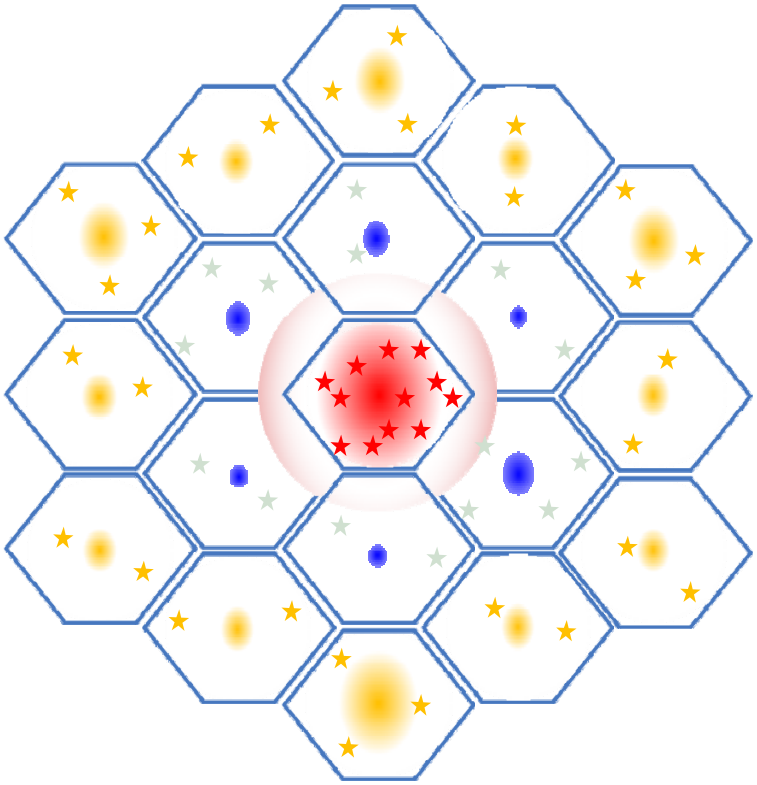
Small fraction of sectors are heavily loaded even during busy hours



Loaded sectors typically have lightly-loaded neighboring sectors



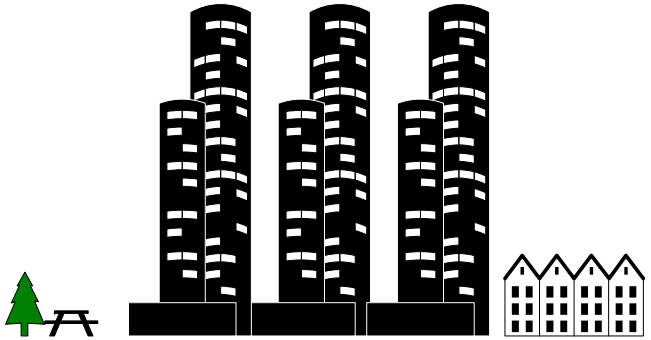
Spatial Isolation via Spatial Load Balancing

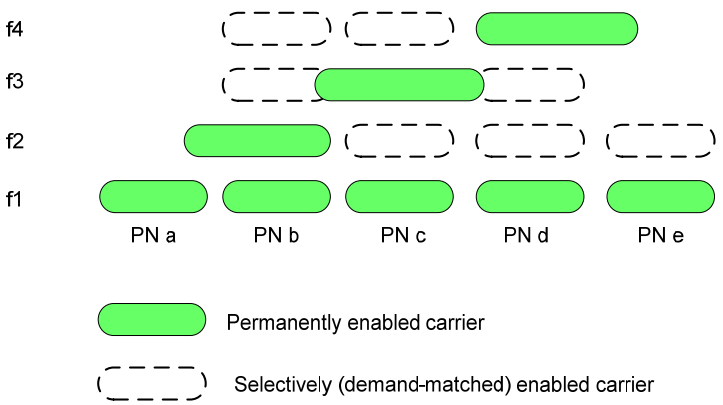


- Offloading sectors adjacent to a chokepoint sector reduces interference to it
- Dynamic Spatial Isolation can maximize network capacity
- Network induced server re-pointing algorithm to maximize network throughput and user performance by taking FL SINR and loading differential into account
- Enhanced performance for existing and new devices

Spatial Isolation via Frequency Domain Interference Avoidance

- Carriers are deployed to handle peak load, and often same number of carriers are deployed throughout a region
- Selectively disabling carriers reduces power utilization, and increases performance of adjacent sectors
- Improved performance for existing and new devices
- Example:
  - 2-carriers always enabled for PN b, c, d due to high demand (re-use pattern improves performance)
  - Additional carriers enabled as demand increases





Spatial Isolation via Time Domain Interference Avoidance

- All sectors assigned a common interlace and each sector assigned a time-reuse interlace
- Scheduler biased to serve high SINR users on common interlace and low SINR (interference-limited) users on time-reuse interlaces
- Sectors assigned a preferred interlace order (OR fixed assignment) and use additional interlaces with increasing demand
- Performance improvement for existing and new devices is achieved if load in each sector is below a threshold